



Bayesian Deep Learning: A Hybrid Approach to Predict Air Pollution

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Date: August 8 (Wednesday), 2018

Time: 3:30pm to 4:30pm

Location: EEB 248

Abstract:

Air pollution has deteriorated rapidly in many metropolitan cities, such as Beijing. Since poor air quality has clear public health impacts, accurately monitoring and predicting the concentration of $PM_{2.5}$ and other pollutants have become increasingly crucial. This talk presents a hybrid approach where time series decomposition and Bayesian Long Short-Term Memory (BLSTM) are combined as a framework for air pollution forecast, based on historical data of air quality, meteorology and traffic in Beijing. LSTM has been proven to achieve state-of-the-art performance in many time series prediction applications due to its capability of memorizing long term sequential correlations. In addition, the model uncertainty estimates generated by Bayesian methods may reduce overfitting, improving the accuracy of the prediction. In our experiment, deseasonalized features are fed into BLSTM to predict the air pollution in the next 48 hours of each monitoring station in Beijing. Results show that the BLSTM framework outperforms the baseline models including SVR, STL, ARIMA, and traditional LSTM with dropout regularization.

Bio:



Victor O.K. Li received SB, SM, EE and ScD degrees in Electrical Engineering and Computer Science from MIT. Prof. Li is Chair of Information Engineering and Cheng Yu-Tung Professor in Sustainable Development at the Department of Electrical & Electronic Engineering (EEE) at the University of Hong Kong. He is the Director of the HKU-Cambridge Clean Energy and Environment Research Platform, an interdisciplinary collaboration with Cambridge. He was the Head of EEE, Assoc. Dean (Research) of Engineering and Managing Director of Versitech Ltd. He serves on the board of Sunevision Holdings Ltd., listed on the Hong Kong Stock Exchange and co-founded Fano Labs Ltd., an artificial intelligence (AI) company with his PhD student. Previously, he was Professor of Electrical Engineering at the University of Southern California

(USC), Los Angeles, California, USA, and Director of the USC Communication Sciences Institute. His research interests include big data, AI, optimization techniques, and interdisciplinary clean energy and environment studies. In Jan 2018, he was awarded a USD 6.3M RGC Theme-based Research Project to develop deep learning techniques for personalized and smart air pollution monitoring and health management. Sought by government, industry, and academic organizations, he has lectured and consulted extensively internationally. He has received numerous awards, including the PRC Ministry of Education Changjiang Chair Professorship at Tsinghua University, the UK Royal Academy of Engineering Senior Visiting Fellowship in Communications, the Croucher Foundation Senior Research Fellowship, and the Order of the Bronze Bauhinia Star, Government of the HKSAR. He is a Fellow of the Hong Kong Academy of Engineering Sciences, the IEEE, the IAE, and the HKIE. He can be contacted at vli@eee.hku.hk.

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